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Software patents and the Internet of Things in Europe, the United States, and India

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Abstract. *This article sheds light on the pressing issue of the patentability of computer-implemented inventions by giving account of the approaches followed in Europe, United States, and India. The occasion of this study is the adoption in 2016 of the final version of the Indian guidelines on the examination of computer-related inventions, which have been surprisingly overlooked in the legal literature. The main idea is that the Internet of Things will lead to a dramatic increase of applications for software patents and if examiners, courts, and legislators will not be careful, there is the concrete risk of a surreptitious generalised grant of patents for computer programs as such (in Europe) and for abstract ideas (in the United States). The clarity provided by the Indian guidelines, following a lively public debate, can constitute good practices that Europe and the United States should take into account.*

ADD INTELLECTUAL VENTURES

Keywords: computer-implemented inventions, computer-related inventions, software patents, software-related patents, India, guidelines for examination of computer related inventions, Internet of Things, IoT, US, computer programs, patentability, eligibility for protection, excluded subject matter, quantified self, activity tracking, wearables, *Jawbone v Fitbit*, databases, filtering, *Bascom Global Internet Services, Inc. v. AT&T Mobility LLC*, *ENFISH, LLC v. Microsoft Corp*., *Alice Corp. v. CLS Bank International*, *Mayo v Prometheus*, virtual reality, holograms, augment reality, G 3/08, Office of the Controller General of Patents, Designs and Trade marks

1. Introduction

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A computer-related invention (CRI, or computer-implemented invention, CII, in the European formulation) involves the use of a computer, computer network or other programmable apparatus, where one or more features are realised wholly or partly by means of a computer program. CRIs and CIIs are a critical topic in patent law, since a too relaxed approach in awarding grants for this kind of inventions may risk to allow a double protection for computer programs: copyright and patents. Thus, a too much broad monopoly would be legitimised, with a subsequent increased propertisation of intangibles. A similar problem can occur in the United States, notwithstanding the patentability of computer programs *per se*. There the risk is the eligibility for protection of mere abstract ideas.

This article sheds light on a much pressing issue by giving account of the approaches followed in Europe, United States, and India. The occasion of this study is the adoption of the final version of the Indian guidelines on CRIs, which have been surprisingly overlooked in the legal literature. The main idea is that the Internet of Things (IoT) will lead to a dramatic increase of applications for software patents and if examiners, courts, and legislators will not be careful, there is the concrete risk of a surreptitious generalised grant of patents for computer programs as such (in Europe) and for abstract ideas (in the United States). The clarity provided by the Indian guidelines, following a lively public debate, can constitute good practices that Europe and the United States should take into account.

2. Computer-implemented inventions in the case law of the European Patent Office

The protection of computer programs has always been a much debated topic. Whether to protect them, how to protect them: copyright, patents, or both. The European Patent Convention (EPC) excludes the patentability of computer programs claimed "as such" (art. 52(2)(c) and (3) EPC). Patents are not granted merely for program listings, which are protected by copyright. If a technical problem is solved in a novel and non-obvious manner, a CII patent may be granted.

For quite a long time, it was well established that the exclusion under Art. 52(2)(c) and (3) EPC applied to all computer programs, independently of their contents, independently of what the program could do or perform when loaded into an appropriate computer (e.g. *Röntgeneinrichtung* and *Editable document form*). This is no longer the case.

The turning point has been *Computer program product/IBM*. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) played a critical role in the reasoning of the Boards of Appeal. Indeed, it was observed that under art. 27(1) TRIPS "patents shall be available for any inventions, whether products or processes, in all fields of technology". Therefore, allegedly, it would have been the clear intention of the TRIPS not to exclude from patentability any inventions, and, consequently, to include computer programs, provided that they have technical character. It is still not entirely clear what this technical character is, it would seem that it is everything that goes beyond the physical modifications of the hardware consisting in causing electrical currents, since this is common to all the computer programs. It is interesting that the latter are deemed to possess a technical character even if they do not produce a direct technical effect: the potential to produce a technical effect will do.

In my humble opinion, this interpretation collides with art. 10(1) TRIPS, whereby "[c]omputer programs, whether in source or object code, shall be protected as literary works under the Berne Convention". *Ubi lex dixit voluit, ubi noluit tacuit*.

The second turning point has been the opinion of the Enlarged Boards of Appeal in G 3/08. The President of the EPO referred the following point of law: "must a claimed feature cause a technical effect on a physical entity in the real world in order to contribute to the technical character of the claim?" The President noted that according to decisions *Colour television signal* and T 190/94, a technical effect on a physical entity in the real world was required. This was, however, not the case in *Gerätesteuerung/HENZE* and *Clipboard formats I/MICROSOFT*. In these decisions the technical effects were essentially confined to the respective computer programs. According to the Enlarged Boards, *Colour television signal* and T 190/94 merely accepted the effect on a physical entity "as something sufficient for avoiding exclusion from patentability; they did not state that it was necessary". Since *Gerätesteuerung/HENZE* and *Clipboard formats I/MICROSOFT* considered that there were technical effects, "whether the boards concerned considered that these technical effects were on a physical entity in the real world was irrelevant".

Nowadays, the CIIs do not receive a stricter assessment in comparison to other inventions. Indeed, in *DNS determination of telephone number/HEWLETT-PACKARD*, the appellant argued that, since the patent concerned a CII, the triviality test should have been stricter. According to the Board, there is no basis for doing so and "[t]he only 'special' treatment for computer-implemented inventions relates to aspects or features of a non-technical nature; in fact, this treatment is only

special in the sense that the presence of non-technical features is a problem which does not arise in many fields".

'Computer program/computer program product' is one of the trickiest categories. The European Patent Office (EPO), indeed, stresses the (unclear) difference between the said category and the computer programs as a list of instructions: the subject matter is patentable "if the computer program resulting from implementation of the corresponding method is capable of bringing about, when running on a computer or loaded into a computer, a 'further technical effect' going beyond the 'normal' physical interactions between the computer program and the computer hardware on which it is run." (European Patent Office, 2013).

The EPO distinguishes between two situations. On the one hand, inventions in which all the method steps can be carried out by generic data processing means. On the other hand, inventions in which at least one method step requires the use of specific data processing means or other technical devices as essential features (European Patent Office, 2016, 3.9).

Let us have a look at the first sub-category, which presents a higher risk of surreptitious software patenting. The EPO provides a non-exhaustive list which comprises examples of acceptable claim formulations (European Patent Office, 2016, 3.9.1). In particular, the model of acceptable set of claims is as follows: i. Method claim; ii. Apparatus/device/system claim; iii. Computer program (product) claim; iv. Computer-readable (storage) medium/data carrier claim.

If this pattern is followed, when assessing the novelty and inventive step of a set of claims, the examiner will start with the method claim. If the subject-matter of the method claim is considered novel and inventive, the subject-matter of the other claims will normally be novel and inventive as well. Conversely, claims that do not follow the pattern are assessed on a case-by-case basis in view of the requirements of clarity, novelty and inventive step. It is noteworthy that, as an example of the latter, the EPO provides the scenario "when the invention is realised in a distributed computing environment or involves interrelated products" (ibid.), that is, to some extent, the IoT. In this event, "it may be necessary to refer to the specific features of the different entities and to define how they interact to ensure the presence of all essential features" (ibid.), instead of making a mere reference to another claim as in the model set of claims.

It would seem that it could be harder to file an application for an IoT patent, in comparison with an average CII. This seems confirmed by the fact that the user interaction is increasingly important in a technological (and societal) development that claims to put the user at the centre. Indeed, if user interaction is required, an objection under Art. 84 EPC (clear and concise definition of the matter of the claim) may arise "if it is not possible to be determine from the claim which steps are carried out by the user" (European Patent Office, 2016, 3.9.1).

Final confirmation of the fact that IoT applications are less likely to be successful is the separate (and less favourable) regime afforded to inventions in which at least one method step requires the use of specific data processing means or other technical devices as essential features. The example provided is "If the invention involves an interaction between data processing steps and other technical means such as a sensor, an actuator etc." European Patent Office, 2016, 3.9.2). Devices with sensing and actuating capabilities, on the one hand, and data processing on the other hand are the main ingredients of the IoT. Now, sensors and actuators must be comprised in the independent claims if they are essential for carrying out the invention. If the claims do not define which steps are carried out by the data processor or by the additional devices involved, as well as their interactions, objections of unclear and unconcise definition (art. 84 EPC) may arise.

The risk of software patents exists, but the EPO stresses that "it must be clear from the program that it is to be executed on the specific device" (European Patent Office, 2016, 3.9.2). Therefore, either a clear link between the software and the hardware is shown, or the patent would hardly be granted.

The guidelines on methods fully implemented by generic data processing means conclude in an obscure way. It refers to the guidance on claims comprising technical and non-technical features , "[f]or the assessment of inventive step for claims comprising features related to exclusions under Art. 52(2), as is often the case with CII". It is not clear what is often the case. On the one hand, it cannot mean that CIIs often comprise features related to computer programs or methods (and other excluded subject matter), because they always do. On the other hand, it does not seem to mean that CIIs usually fall under the excluded subject matter, because the reference is to the inventiveness test. It is important to keep patentability and inventiveness separate, because even the highest degree of inventiveness must not offset the lack of patentability of computer programs as such.

A common characteristic of CIIs is that non-technical features play a crucial role and they may prevail on the technical features (European Patent Office, 2016, 5.4). This has some effect on the assessment of the inventive step, which requires a non-obvious technical solution to a technical problem (*Two identities/COMVIK*; *Classification method/COMPTEL*). An example may be a method to reduce the network traffic of a game played on the cloud by reducing the maximum number of players. This cannot form the basis for the formulation of an objective technical problem. It is rather a direct consequence of changing the rules of the game, which is inherent in the non-technical scheme.

The EPO considers that some features may be non-technical *per se*, but, in the context of the invention, they could "contribute to producing a technical effect serving a technical purpose, thereby contributing to the technical character of the invention" (European Patent Office, 2016, 5.4). It remains unaffected that "features making no […] contribution [to the technical character of the invention] cannot support the presence of inventive step" (*Two identities/COMVIK*). An example may be a feature which contributes only to the solution of a problem in a field excluded from patentability, such as computer programs.

This passage is critical because, even though the interrelation between software and hardware does not seem critical in the assessment of the patentability of CIIs (G 3/08), it becomes important in the assessment of the inventive step, because if the claimed CII resolves a problem which regards only the software, this problem will not be regarded as technical and the patent will not be granted for lack of inventiveness. Therefore, for instance, the programmer must have had technical considerations beyond "merely" finding a computer algorithm to carry out some procedure (G 3/08). Nonetheless, features of the computer program itself (*Computer program product/IBM*) as well as the presence of a device defined in the claim (*Clipboard formats I/MICROSOFT; Auction method/HITACHI*) may potentially lend technical character to the claimed subject-matter (European Patent Office, 2016, 3.6).

From an IoT perspective, it is worth mentioning the patentability of simulations, given the growing importance of virtual reality, holographic technologies, and augment reality. In *Checkpoint simulation/ACCENTURE*, the Boards of Appeal pointed out that the definition of technical processes seemed not to cover simulations, whose purpose is to replace physical entities with virtual ones. In T 208/84, the board had held that a technical

process is different from a mathematical method in that the technical process is carried out on a physical entity and provides, as its result, a certain change in that entity. *Schaltkreissimulation I/Infineon Technologies* reversed it and held that the simulation of an adequately defined class of technical items could be a functional technical feature. In *Call center/IEX*, finally, the board left open the question whether it is a sufficient condition for a simulation to be patentable that the simulated items be technical. It observed that the simulated system was not technical; therefore, the condition did not hold.

The situation in Europe is still very much uncertain. In 2002, the European Commission drafted a Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions (COM(2002) 92), which was ultimately rejected in 2005. The main reasons for the failure were the fear of extension of the patentable subject matter. It is what it is, but it is clear that harmonised and clear rules would benefit both businesses and consumers.

3. Brief notes on software patents and the Internet of Things. Some recent patent litigation in the US: *Alice* through the looking glass?

Mischievous commentators may argue that the CIIs are a surreptitious way to obtain a double binary for software protection. This may become true with the IoT. Indeed, with the gradual substitution of old products with smart devices, we will face an unprecedented growth of CIIs; therefore, asserting that computer programs are not patentable in Europe may sound hypocritical. In other terms, I foresee that most of the computer programs will be embedded in smart devices, with the consequential patentability of most computer programs under the label of CII.

The impact of the IoT on patents can be observed also from another point of view. I believe that the IoT provokes a redefinition of the concepts of novelty and originality for purposes of assessing patentability, essentially because of two characteristics: (a) network structure: patentability may increasingly derive from the way smart devices interact; (b) composite nature of the said devices: novelty might stem from the way the components of a single device interact.

As to the first aspect, the customers are more and more interested to the novel interaction between their devices, rather than to the device in isolation (let us think a hub in a domotics

context). Interoperability and open standards are the way forward, even though security plays often the role of excuse to build closed sub-systems, thus giving rise to the "Internet of Silos".

When it comes to the composite nature of devices, it means that usually devices incorporate several other devices. A smartphone contains a large number of sensors and a damage may occur because of a defect or inaccuracy of any of the said components of the device. It is not always clear if the liability should fall on the main actor responsible for the composite device or if its component's actors should be liable. Generally speaking, and unless a contrary evidence is provided, I am in favour of the first hypothesis, for at least two reasons.

Firstly, the final manufacturer has a duty to double-check the security and safety of the composite device both when placing it on the market and during the provision of the services. Secondly, it could prove impossible for the customer to track the supply chain and find the responsible for the single sub-thing. The conclusion may be different depending on the openness or closure of the system (e.g. Apple can control third-parties' apps through its store, whereas Android stores are open, thus not allowing the same control). Courts may also give some relevance to the number of sub-things present in the composite thing (an airplane is not the same as a light bulb) and the kind of activity for which the device is used (a defibrillator can save a life and therefore higher standards of security and a stricter scrutiny are required) (Noto La Diega, 2016).

My prediction that CII cases will become more and more common has been confirmed, for instance, by the fact that Davis (2016) opens his list of top patent cases of 2016 with the "Alice reversals". As is common knowledge, *Alice Corp. v. CLS Bank International* held that a computer-implemented, electronic escrow service for facilitating financial transactions was not patentable, in that it covered only abstract ideas.

The petitioner argued that a computer "necessarily exist[s] in the physical, rather than purely conceptual, realm" (Brief for Petitioner 39). According to the US Supreme Court, however, the fact is beside the point. Indeed,

"*There is no dispute that a computer is a tangible system (in §101 terms, a "machine"), or that many computer-implemented claims are formally addressed to patent-*

eligible subject matter. But if that were the end of the §101 inquiry, an applicant could claim any principle of the physical or social sciences by reciting a computer system configured to implement the relevant concept".

If that was the case, the determination of patent eligibility would "depend simply on the draftsman's art," (*Parker v Flook*, at 593), thus sterilizing the rule whereby "'[l]aws of nature, natural phenomena, and abstract ideas are not patentable." (*Association for Molecular Pathology v Myriad Genetics*). *Alice* at 2355 refers to *Mayo v Prometheus*. In *Mayo*, the Supreme Court set forth a two-step analytical framework to identify patents that, in essence, claim nothing more than abstract ideas. The court must first "determine whether the claims at issue are directed to a patent-ineligible concept." If so, the court must then "consider the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." (*Mayo,* 132 S. Ct. at 1298, 1297).

As reported by Sachs (2015), in October 2015 about 73 percent of motions arguing that patents were invalid under *Alice* have been granted by federal courts. In recent times there seem to be a change of policy.

The first example is provided by *ENFISH, LLC v. Microsoft Corp*., which reversed a district court's and conclude that all five claims on appeal were patent-eligible. The Court of Appeals observed at 1335 that

"some improvements in computer-related technology when appropriately claimed are undoubtedly not abstract, such as a chip architecture, an LED display, and the like. Nor do we think that claims directed to software, as opposed to hardware, are inherently abstract"

Applying the *Mayo* two step test, firstly, one has to assess if the claim is on a specific asserted improvement in computer capabilities or on a process that qualifies as an "abstract idea" for which computers are invoked merely as a tool. The second step asks if nevertheless there is some inventive concept in the application of the abstract idea. Therefore, according to *Enfish, Alice* should not be read as broadly holding that all improvements in computer-related technology are inherently abstract, thus having to be considered at step two. In *Enfish*, consequently, *Alice* has been interpreted narrowly, thus considering patentable "a specific improvement to the way computers operate, embodied in the self-referential table" (ibid at 1336).

Other evidence of the change of policy in the sense of a more liberal approach in recognising software patents comes from *Bascom Global Internet Services, Inc. v. AT&T Mobility LLC*. The US Court of Appeals for the Federal Circuit reversed a decision of the US District Court for the Northern District of Texas (No. 3:14-cv-03942-M, Judge Barbara M.G. Lynn) by holding that Bascom Global Internet Services' patent on filtering internet content improved computer functioning and, therefore, was not an abstract idea. The broad approach builds on *DDR Holdings, LLC v. Hotels.com* (Judge Raymond Chen filed both the majority opinions), whereby what matters is that an invention "is not merely the routine or conventional use of the Internet" (ibid. at 1259). One has to notice that the *Enfish* claims, understood in light of their specific limitations, were unambiguously directed to an improvement in computer capabilities. Unlike *Enfish*, here the claims and their specific limitations "do not readily lend themselves to a step-one finding that they are directed to a nonabstract idea" (*Bascom* at 13). Therefore, the Court defer its consideration of the specific claim limitations' narrowing effect for step two, which means assessing the inventive concept. Allegedly, the District Court has ignored that "[t]he inventive concept inquiry requires more than recognizing that each claim element, by itself, was known in the art. As is the case here, an inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces" (ibid. at 15). Finally, it is interesting that the concurring opinion tends towards an even more relaxed approach to software patents. Indeed, Judge Newman urges "a more flexible approach to the determination of patent eligibility, for the two-step protocol for ascertaining whether a patent is for an 'abstract idea' is not always necessary to resolve patent disputes".

If the stream inaugurated with *DDR* and confirmed by *Enfish* and *Bascom* will lead the development of the future case law, there is the concrete risk that patents will be granted for every software and method, with the sole exclusion of "longstanding, well-known method[s] of organizing human behavior" (*Bascom* at 12). If one analyses the relevant decisions of September and October 2016, the aftermath does not provide evidence for a clear prediction. Indeed, on the one hand, *Fairwarning IP, LLC v. Iatric Sys, Inc*., *Affinity Labs, LLC v. Amazon.Com Inc. et al*., and *Intellectual Ventures I LLC v. Symantec Corp.* conclude with patent-ineligible subject matter. On the other hand, leveraging the above analysed recent case law, *Micro, Inc. v. Bandai Namco Games Am., Inc.* concluded that "the ordered combination of claimed steps, using unconventional rules that relate sub-sequences

of phonemes, timings, and morph weight sets, is not directed to an abstract idea is patent-eligible".

There is the risk of a gradual departure from *Alice* and *Mayo*, up to the point of patenting abstract ideas with no proper inventive concept. Soon, we might leave Wonderland and *Alice* may be looked at only through the looking glass. I join the concurring opinion of Judge Mayer in *Intellectual Venture* (considered the "big event" of the case by Crouch, 2016), whereby claims directed to software implemented on a generic computer are categorically not eligible for patent. In particular,

"*the claims at issue in* BASCOM, Enfish, *and* DDR, *like those found patent ineligible in Alice, do 'no more than require a generic computer to perform generic computer functions'* Alice, *134 S. Ct. at 2539. Eliminating generally-implemented software patents would clear the patent thicket, ensuring that patent protection promotes, rather than impedes, 'the onward march of science' (*O'Reilly v Morse, *56 U.S. (15 How.) 62, 113 (1853), and allowing technological innovation to proceed apace*".

Roberts (2016) has commented that now, given this concurring opinion, "software patents are in peril". It is not causal that the other point of Judge Mayer's opinion was that "patents constricting the essential channels of online communication run afoul of the First Amendment". Indeed, a holistic approach to patents should take into account a number of trade-offs and endeavour to strike a balance between the conflicting interests, such as the right of the applicant to government-sanctioned monopolies, on the one hand, and, on the other hand, the "right to receive information and ideas [which] regardless of their social worth, is fundamental to our free society." (Stanley v. Georgia, 394 U.S. 557, 564 (1969). A similar approach, unprecedented in US law according to Crouch (2016), is already part of the European tradition, as one can see, for instance, in *GS Media BV v Sanoma Media Netherlands BV and others*, even though sometimes the result of the balance favours private interests, as pointed out by Nivarra (2011). Indeed, on 8 September 2016, the Court of Justice, in proposing a liberal approach to hyperlinking, has stressed that

"*the harmonisation effected by it is to maintain, in particular in the electronic environment, a fair balance between, on one hand, the interests of copyright holders and related rights in protecting their intellectual property rights, safeguarded by Article 17(2) of the Charter of Fundamental Rights of the European Union ('the Charter') and, on the other, the protection of the interests and fundamental rights of users of protected objects, in particular their freedom of*

expression and of information, safeguarded by Article 11 of the Charter, and of the general interest" (*GS Media* at 31).

Finally, news from the world of quantified self and activity tracking confirm that CII litigation is increasing in relation to the growth of the IoT. An example is provided by *Jawbone v Fitbit*. The companies involved are giants in the market of quantified self and wearables. On 28 April 2016, two of the Jawbone' patents that were disputed at the U.S. International Trade Commission (ITC) have been invalidated. Since Jawbone was trying to leverage those patents to prevent Fitbit's imports in the US, now this results appears hardly achievable. However, a Jawbone representative has pointed out that the patent ruling will be appealed and that "the two patents that are the subject of the ITC ruling represent only a portion of Jawbone's case against Fitbit and a small subset of Jawbone's overall patent portfolio" (Goode, 2016). Nonetheless, on 23 August 2016, Judge Dee Lord of the ITC struck-down Jawbone's request for an import ban against Fitbit products "the competitors' cross-filings for patent infringements had all been invalidated" (Trade Secrets Institute, 2016).

What is interesting from our perspective, is the official court filing states that the claims on the relevant patents "seek a monopoly on the abstract ideas of collecting and monitoring sleep and other health-related data." Consequently, they are not eligible for the grant of a patent, also because "no innovating concept is claimed in either patent. With particular regard to systems for organizing human activity, the courts have determined that a patent is not eligible when it claims the use of computer technology to accomplish tasks that were in the past performed by human beings." the filing states.

This ruling takes a strict approach to CIIs, which is commendable, since we foresee that an increasing number of applications for patents on IoT-software will be filed. The ruling has also an impact on the world of artificial intelligence and artificial enhancement. These technologies are progressively substituting human beings in their everyday tasks. Inventors and developers shall be aware that, generally speaking, there will be a tendency not to award patents for inventions enabling machines to accomplish tasks once performed by human beings.

4. The Guidelines on the examination of computer-related inventions. Historical background, basic concepts and the (not always savvy) protests of the civil society.

It is not sufficiently known that India has a pioneering role in the development of new technologies and new approaches to the concept itself of innovation.

A notable example is Ministry of Electronics & Information Technology (2015), which builds on the 'Digital India Programme.' In issuing it, the Department of Electronics and Information Technology ('DeitY') pursued four goals. Firstly, to create an IoT industry in India of USD 15 billion by 2020 (with a share of 5-6% of global IoT industry.) Secondly, to undertake capacity development for IoT specific skill-sets for domestic and international markets. Thirdly, to undertake R&D for all the assisting technologies. Lastly, to develop smart devices specific to Indian needs in all possible domains. The policy has been seen by Aggarwal (2015) as the realisation of the "*Zero Defect Zero Effect*" slogan, which was coined by Prime Minister of India, Narendra Modi. Part of the Make in India strategy, it denotes manufacturing mechanisms whereby the possibility of error and the environmental impact are, or should be, eliminated. Malevolent commentators may judge it as a 'green washing' policy in order to convince transnational corporations to manufacture their products in India and to increase the exportations. In fact, in the Independence Day speech, Modi had said that the 'zero defect, zero effect' policy was critical so that "our exported goods are never returned to us." (Modi, 2014) However, the reasons for the policy will prove to be of secondary importance, as long as the implementation activities will be carried out with the bottom-up inclusive approach that we are seeing in the deployment of the Indian smart cities plan, as in Ministry of Urban Development (2015).

Future research shall focus on the risks of such a fast growth. For instance, in 2010, the Government of India (better said, the Unique Identification Authority of India, 'UIDAI') has started collecting biometric data (mainly fingerprints and iris signatures) as a condition to issue the so-called Aadhaar number and card. Without the number, one cannot apply for subsidies. The UIDAI has already collected the biometric data of nearly a billion people (Miglani & Kumar, 2016). On 25 March 2016, the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016 has received the assent of the President. The Act provides federal agencies with the right to access the said database in the interest of national security. There is the actual risk of using the largest biometric database in the world for surveillance purposes.

India, unlike the US, is following the double-binary European approach. Indeed, s.3(k) of the Patents Act 1970 states that a "computer programme *per se*" is not patentable, but until recently it was not clear whether CRIs were excluded from the subject matter or not. The silence kept on CRIs will not surprise who knows that the Patents Act, notwithstanding its amendments, remains an old act, as shown inter alia by the several provisions on floppy disks.

The path towards the introduction of software patents had been gradual and Brownian. In 2002, the Patents (Amendments) Act, 2002 introduced the words 'per se' in s.3(k) of the Patents Act. This was explained by the Joint Parliamentary Committee by saying that "sometimes the computer program may include certain other things, ancillary thereto or developed thereon. The intention here is not to reject them for grant of patent if they are inventions. However, the computer programs as such are not intended to be granted patent." (Comments and recommendations on the Guidelines, 2015). The first guidance explained 'ancillary' by referring to "things which are essential to give effect to the computer program."

The second step was the Patents (Amendment) Ordinance, 2004. At that time, an amendment to provide for the patentability of computer programs insofar as they enhanced technology was rejected by the Lok Sabha and the Rajya Sabha (the houses of the Parliament of India), "as they feared that this would be beneficial only to multinational companies." (Chathurvedula, 2015).

A similar failed attempt was made by the Patents (Amendment) Bill, 2005 that sought to extend patentability to computer programs with "technical application to industry". The 'transnational corporations' exception was successfully raised again.

In 2011, then, the Controller General of Patents, Designs and Trade marks (hereinafter the 'Controller', the Indian homologous of the Intellectual Property Office) clarified that "claims directed at 'computer program products' are computer programs per se stored in a computer readable medium and as such are not allowable." (Office of Controller General of Patents, Designs & Trademarks 2011, 08.03.05.10.) Moreover, when a claim inter alia contains a subject matter that is not limited to a computer program, "it is examined whether such subject matter is sufficiently disclosed in the specification and forms an essential part of the invention." (ibid).

It is notable that the draft CRI guidelines published in 2013 were clear as to the exclusion of any computer program that may work on any general-purpose computer or "related device" (mainly smart devices) did not meet the requirements of law.

In August 2015, the Controller issued the first CRI guidance; it allowed the patenting of programs, which demonstrated technical advancement. Unsurprisingly, the guidance gave rise to protests of the civil society. Many organisations and citizens, indeed, complained about the contrast with s.3(k) of the Patents Act and because software patentability was seen as a break to innovation (Concerns over the "Guidelines, 2015). To be precise, the guidance reaffirmed that computer programs per se were excluded from patentability and, therefore, "[c]laims which are directed towards computer programs per se are excluded from patentability"; consequently, the citizens' claims that computer programs were excluded "unconditionally" and that the one at issues was a 'blanket exclusion' were not entirely correct. Moreover, for being considered patentable, the subject matter should involve either "- a novel hardware, or - a novel hardware with a novel computer program, or - a *novel computer program with a known hardware* which goes beyond the normal interaction with such hardware and affects a change in the functionality and/or performance of the existing hardware." The 'physical' element looked critical, but the third category presented some ambiguity. In addition, the attached clarification was not helpful (also, it was not clear if it was a clarification or a fourth category): a computer program, "when running on or loaded into a computer, going beyond the 'normal' physical interactions between the software and the hardware on which it is run, and is *capable of bringing further technical effect may not be considered as exclusion under these provisions*." (Office of Controller General of Patents, Designs and Trademarks (2013), para 5.1).

The letter of the civil society complained that the patentability of software was maintained dependent on the industrial applicability. This is not precise. Whereas the cited patentability as a result of technical effect could be tricky, the guidance limited itself to state that "[t]he examination procedure of patent applications relating to CRIs is the same as that for other inventions to the extent of consideration of novelty, inventive step, industrial applicability, sufficiency of disclosure and other requirements under the Patents Act and the rules made thereunder."

After the said protests, with order No. 70 of 2015, the Controller announced that the criticised guidance was to be "kept in abeyance till discussions with stakeholders are completed and contentious issues are resolved." The discussions have been completed and the contentious issues

resolved on 19 February 2016, when the Controller published the new guidelines on the examination of CRIs (Office of the Controller General of Patents, Designs and Trade marks, 2016).

CRIs now comprise "inventions which involve the use of computers, computer networks or other programmable apparatus and include such inventions having one or more features of which are realized wholly or partially by means of a computer program or programs." Incidentally, one may note that 'other programmable apparatus' is a flexible concept indeed capable to encompass smart devices. The pendant of this notion is the 'computer system', which, under the Information Technology Act, 2000 is "a device or collection of devices, including input and output support devices and excluding calculators which are not programmable and capable of being used in conjunction with external files, which contain computer programs, electronic instructions, input data and output data, that performs logic, arithmetic, data storage and retrieval, communication control and other functions." A very 'IoT' dictionary. Even before that, the definition of 'computer' is sufficiently flexible to accommodate the IoT specific characteristics. The term 'computer' is defined in The Information Technology Act, 2000 as "any electronic, magnetic, optical or other high-speed data processing device or system which performs logical, arithmetic, and memory functions by manipulations of electronic, magnetic or optical impulses, and includes all input, output, processing, storage, computer software, or communication facilities which are connected or related to the computer in a computer system or computer network."

The new guidelines reaffirm the exclusion of the software patents and introduces a three-step test to determine the applicability of s.3(k) of the Patents Act to CRIs. Indeed, "[e]xaminers may rely on the following three stage test in examining CRI applications: (1) Properly construe the claim and identify the actual contribution; (2) If the contribution lies only in mathematical method, business method or algorithm, deny the claim; (3*) If the contribution lies in the field of computer program, check whether it is claimed in conjunction with a novel hardware* and proceed to other steps to determine patentability with respect to the invention." (Guidelines 2016, s.5) Therefore, if the hardware is not novel (e.g. some innovative smart device), then no patent will be granted. It would seem, consequently, that computer programs running on traditional computers should be excluded by the subject matter of patents. This is particularly clear if one reads the previous version of the guidelines, which included the eligibility of "a novel computer programme with a known

hardware which goes beyond the normal interaction with such hardware and affects a change in the functionality and/or performance of the existing hardware".

Moreover, even though the phases of the examination procedure of CRIs are the same as the other inventions as to novelty, inventive step, industrial applicability and sufficiency of disclosure, "[t]he determination that the subject matter relates to one of the excluded categories requires greater skill on the part of the examiner." While explaining that these concepts apply equally to ordinary inventions and to CRIs, the Controller specifies that the "determination of industrial applicability in case of CRIs is very crucial since applications relating to CRIs may contain only abstract theories, lacking in industrial application." Furthermore, it explains how the sufficiency of disclosure applies to CRIs. The said requirement means that the invention has to be described "fully and particularly" ('what') and the specification has to explain the best method of operation. Under para. 4.4.2 of the new guidance, "[t]he best mode of operation and/or use of the invention shall be described with suitable illustrations. The specification should not limit the description of the invention only to its functionality rather it should specifically and clearly describe the implementation of the invention.

Even though the use of 'may' might suggest a certain scope for the examiners' discretion and one would have expected that the excluded subject matter should have to be interpreted in a stricter way (as opposed to require "greater skill"), the wording is adamant in linking the patentability of CRIs to inventions which constitute an inextricable mixture of software and (novel) hardware; that is to say, to smart devices. From this point of view, the new CRI guidance may be a formidable input to the developments of IoT inventions, now supported by legal clarity and certainty. Moreover, as a policy recommendation and in consideration of the foreseen growth of CIIs due to the IoT, the European Patent Office may want to be inspired by the Indian guidelines to update and deepen its out-of-date and insufficiently thorough guidance. A first commendable step has been the publication of the 8th edition of *Case Law of the Boards of Appeal of the European Patent Office* in July 2016, but some ad-hoc guidelines would be more appropriate.

5. Conclusions

With the advent of the IoT, applications for software patents disguised as CIIs will increase substantially in Europe. A similar phenomenon will take place in the United States, where there is the risk of a departure from *Alice*, with subsequent patentability of abstract ideas.

The traditional view is that the United States Patent and Trademark Office undertakes less rigorous patent examination than the EPO (Nightingale, 2016). I do not know if the contrary has become true, like a recent study claims (Christie et al., 2016). However, in the field of CIIs it seems to me that both the systems are prone to recognizing a wide protection with subsequent increased propertisation of knowledge. It may be not useless to remember that intellectual property is about striking a balance between a number of (sometimes conflicting) private and public interests. A too strong patent regime for computer programs, in a moment when software is being embedded in most traditional devices, risks not to take into account the trade-off between remuneration of the investments and public good. Moreover, the prevalence of proprietary models can jeopardise interoperability, which is at the very heart of the IoT. Furthermore, there are issues of competition law. It has been noted that since IoT manufacturers will run to get patents "[n]ational regulators must […] apply utmost prudence to ensure that grants do not act as barriers to new entrants in existing and emerging markets" (Consumers International, 2016, 78). From a consumer law perspective, there is the "risk that intellectual property arguments and digital rights management will extend to products and services containing software, and risk superseding consumer protection law" (ibid., 5). But regimes such as product liability, unfair terms, and unfair commercial practices can prevail on contracts and licences, thus preventing intellectual property abuses.

There are some good practices to be followed. For instance, on 28 October 2016 a new exemption to the Digital Millennium Copyright Act has come into force allowing the circumvention of DRM and the reverse engineering of consumer devices for security purposes. Being eventually legal to hack one's own devices, it would seem that consumers may be (relatively) back in control of their devices, notwithstanding the intellectual property protections (Greenberg, 2016).

Another approach that should be followed is the Indian one. After the civil society has (maybe too) harshly criticised the first version of the guidelines on the CRIs, the Government has revised them in order to make clear that in no way CRIs will be a surreptitious way of granting software patents.

It is not entirely clear if the United States and Europe are going towards the patentability of abstract ideas and computer programs *per se*, respectively. The above analysis has sent mixed signals. One should only wish that legislators and regulators were

aware of the indeed negative consequences of software patents becoming commonplace in an IoT world.

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